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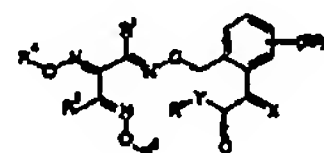
(72) SCHELBERGER, KLAUS (DE).

GROTE, THOMAS (DE).  
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SAUTER, HUBERT (DE).

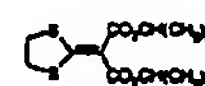
(74) ROBIC

(54) MELANGES FONGICIDES A BASE DE DERIVES D'OXIMETHER DE DIATOMITE ET DE FONGICIDES DU RIZ  
(54) FUNGICIDE MIXTURES BASED ON TRIPLE OXIME ETHER DERIVATIVES AND RICE FUNGICIDES

(57) The invention relates to fungicide mixtures comprised as active components a) phenylacetic acid derivatives of formula (I) in which the substituents and the index have the meanings cited in the description, and the salts thereof, and b) at least one compound of formulas (II) to (VII) in a synergistically effective quantity.



(I)



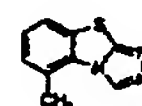
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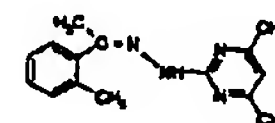
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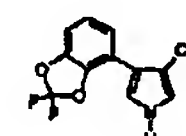
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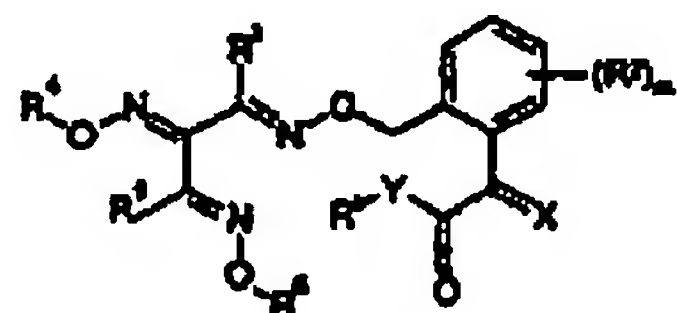
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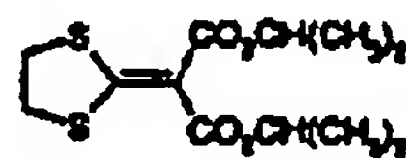
(VII)



- (72) SCHELBERGER, KLAUS, DE  
(72) GROTE, THOMAS, DE  
(72) SAUTER, HUBERT, DE  
(72) AMMERMAN, EBERHARD, DE  
(72) LORENZ, GISELA, DE  
(72) STRATHMANN, SIEGFRIED, DE  
(71) BASF AKTIENGESELLSCHAFT, DE  
(51) Int.Cl.<sup>6</sup> A01N 37/50, A01N 43/90, A01N 43/54, A01N 57/14,  
A01N 43/36, A01N 43/28  
(30) 1998/03/24 (198 12 765.0) DE  
(54) **MELANGES FONGICIDES A BASE DE DERIVES  
D'OXIMETHER DE DIATOMITE ET DE FONGICIDES DU RIZ**  
(54) **FUNGICIDE MIXTURES BASED ON TRIPLE OXIME ETHER  
DERIVATIVES AND RICE FUNGICIDES**



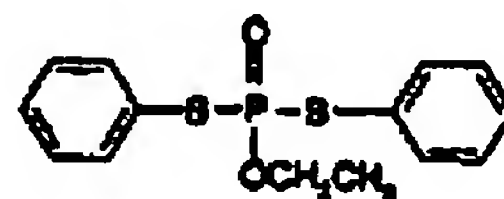
(I)



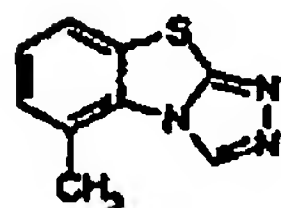
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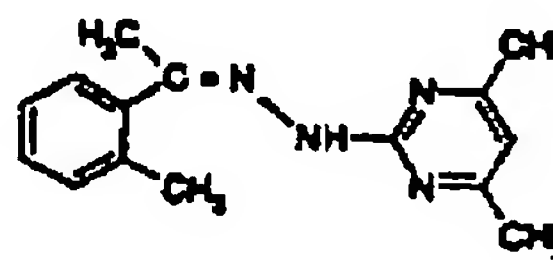
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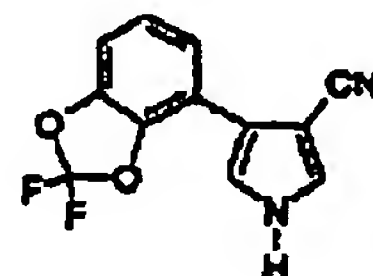
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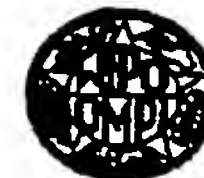


(VII)

(57) L'invention concerne des mélanges fongicides contenant comme constituants actifs (a) des dérivés d'acide phénylacétique de la formule (I), dans laquelle les substituants et l'indice ont la signification indiquée dans la description, ainsi que leurs sels, et (b) au moins un composé des formules (II) à (VII) dans des quantités produisant un effet synergique.

(57) The invention relates to fungicide mixtures comprised as active components a) phenylacetic acid derivatives of formula (I) in which the substituents and the index have the meanings cited in the description, and the salts thereof, and b) at least one compound of formulas (II) to (VII) in a synergistically effective quantity.





**PCT**  
WELTORGANISATION FÜR GEISTIGES EIGENTUM  
Internationales Büro  
INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE  
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

<p>(51) Internationale Patentklassifikation 6 : <b>A01N 37/50 // (A01N 37/50, 57:14, 43:90, 43:54, 43:36, 43:28)</b></p>	<p><b>A1</b></p>	<p>(11) Internationale Veröffentlichungsnummer: <b>WO 99/48368</b></p> <p>(43) Internationales Veröffentlichungsdatum: <b>30. September 1999 (30.09.99)</b></p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>(21) Internationales Aktenzeichen: <b>PCT/EP99/01910</b></p> <p>(22) Internationales Anmeldedatum: <b>22. März 1999 (22.03.99)</b></p> <p>(30) Prioritätsdaten: <b>198 12 765.0      24. März 1998 (24.03.98)      DE</b></p> <p>(71) Anmelder (für alle Bestimmungsstaaten ausser US): <b>BASF AKTIENGESELLSCHAFT [DE/DE]; D-67056 Ludwigshafen (DE).</b></p> <p>(72) Erfinder; und (75) Erfinder/Anmelder (nur für US): <b>SCHELBERGER, Klaus [AT/DE]; Traminerweg 2, D-67161 Gönnsheim (DE). GROTE, Thomas [DE/DE]; Breslauer Strasse 6, D-67105 Schifferstadt (DE). SAUTER, Hubert [DE/DE]; Neckarpromenade 20, D-68167 Mannheim (DE). AMMERMAN, Eberhard [DE/DE]; Von-Gagem-Strasse 2, D-64646 Heppenheim (DE). LORENZ, Gisela [DE/DE]; Erlengweg 13, D-67434 Neustadt (DE). STRATHMANN, Siegfried [DE/DE]; Donnersbergstrasse 9, D-67117 Limburgerhof (DE).</b></p> <p>(74) Gemeinsamer Vertreter: <b>BASF AKTIENGESELLSCHAFT; D-67056 Ludwigshafen (DE).</b></p> </div> <div style="width: 48%; vertical-align: top;"> <p>(81) Bestimmungsstaaten: <b>AL, AU, BG, BR, BY, CA, CN, CZ, GE, HU, ID, IL, IN, JP, KR, KZ, LT, LV, MK, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TR, UA, US, ZA, eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</b></p> <p><b>Veröffentlicht</b> <i>Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist; Veröffentlichung wird wiederholt falls Änderungen eintreffen.</i></p> </div> </div>		
<p>(54) Title: <b>FUNGICIDE MIXTURES BASED ON TRIPLE OXIME ETHER DERIVATIVES AND RICE FUNGICIDES</b></p> <p>(54) Bezeichnung: <b>FUNGIZIDE MISCHUNGEN AUF DER BASIS VON TRIPELOXIMETHERDERIVATEN UND REISFUNGIZIDEN</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;">  (I)         </div> <div style="text-align: center;">  (IV)         </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;">  (II)         </div> <div style="text-align: center;">  (V)         </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;">  (III)         </div> <div style="text-align: center;">  (VI)         </div> </div> <div style="text-align: center; margin-top: 20px;">  (VII)         </div>		

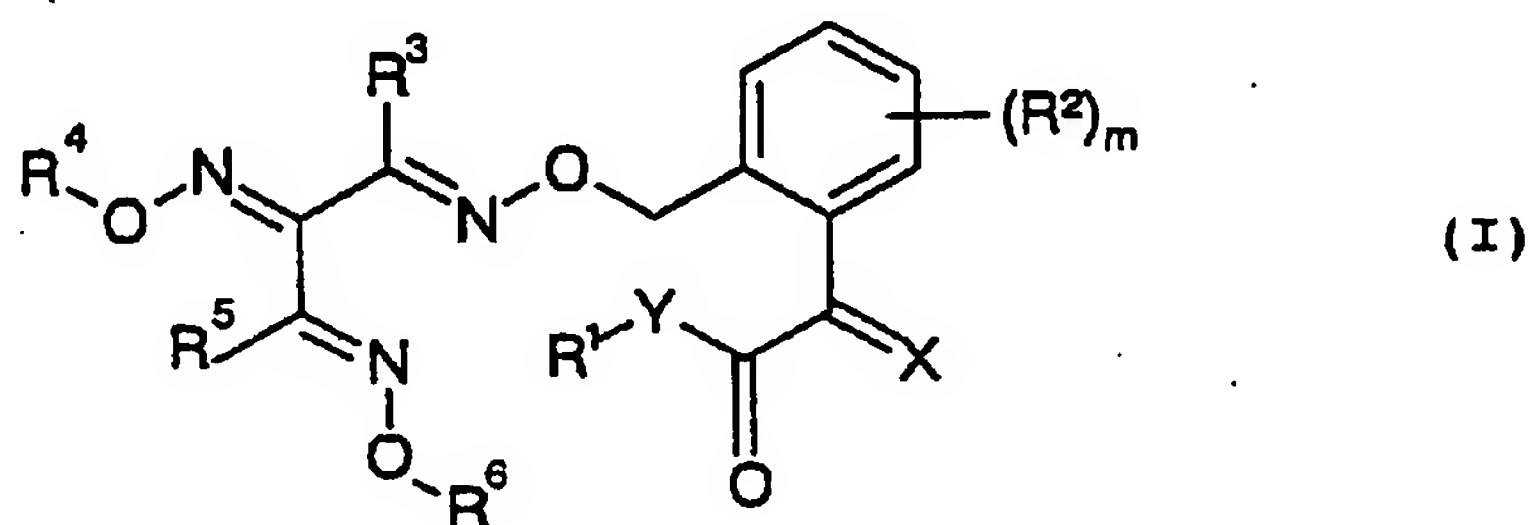
L.F.

FUNGICIDE MIXTURES BASED ON TRIPLE OXIME  
ETHER DERIVATIVES AND RICE FUNGICIDES

The present invention relates to fungicidal mixtures for controlling harmful fungi, which [lacuna]

a) phenylacetic acid derivatives of the formula I

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in which the substituents and the index have the following meaning:

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X is NOCH<sub>3</sub>, CHOCH<sub>3</sub> or CHCH<sub>3</sub>;

Y is oxygen or NR;

R<sup>1</sup>, R independently of one another are each hydrogen or C<sub>1</sub>-C<sub>4</sub>-alkyl;

R<sup>2</sup> is cyano, nitro, trifluoromethyl, halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxy;

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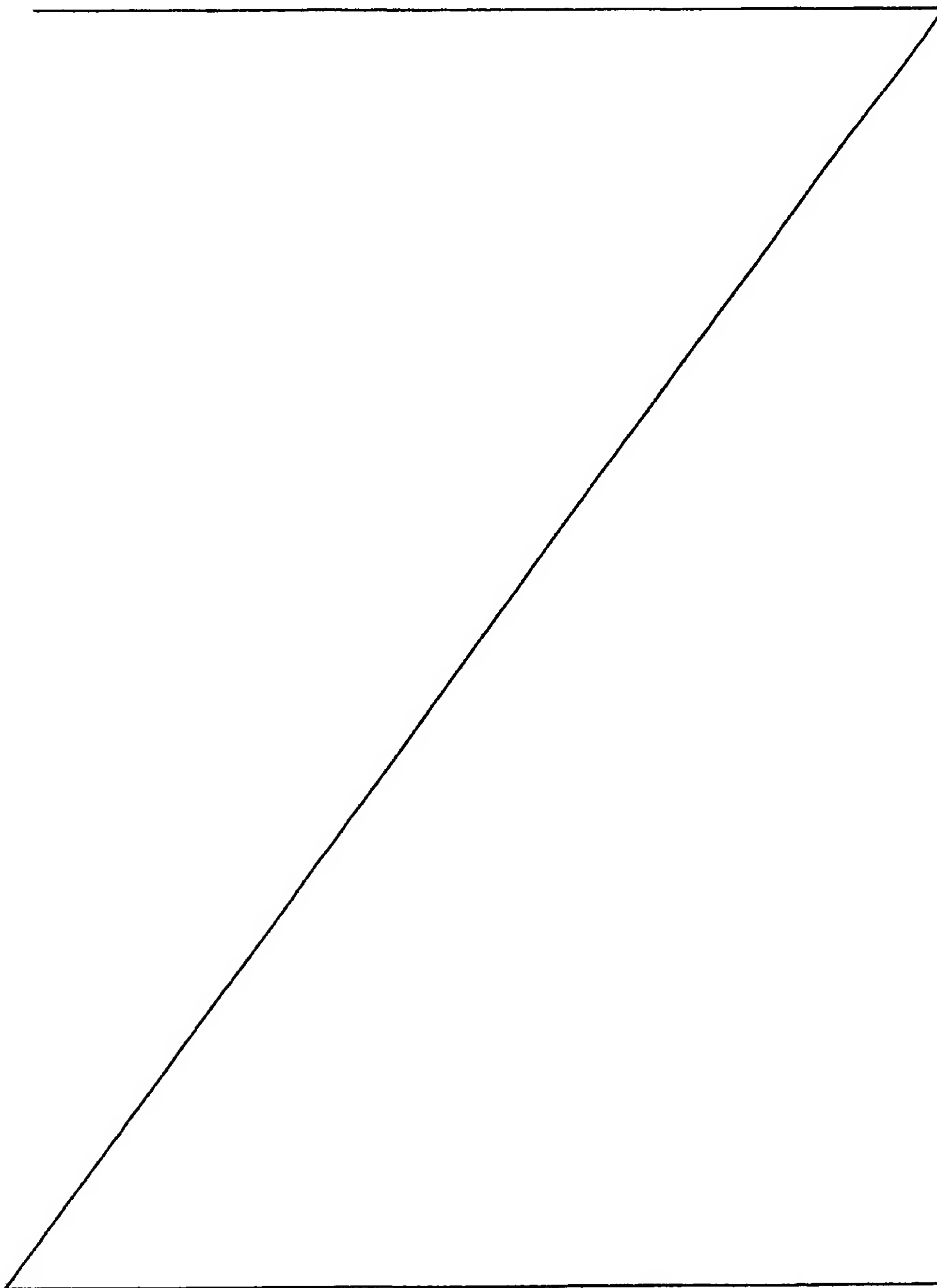
m is 0, 1 or 2, where the radicals R<sup>2</sup> may be different if m is 2;

R<sup>3</sup> is hydrogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

R<sup>4</sup>, R<sup>6</sup> independently of one another are each hydrogen,

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are C<sub>1</sub>-C<sub>10</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>2</sub>-C<sub>10</sub>-alkenyl,  
C<sub>2</sub>-C<sub>10</sub>-alkynyl, C<sub>1</sub>-C<sub>10</sub>-alkylcarbonyl,  
C<sub>2</sub>-C<sub>10</sub>-alkenylcarbonyl, C<sub>3</sub>-C<sub>10</sub>-alkynylcarbonyl or  
C<sub>1</sub>-C<sub>10</sub>-alkylsulfonyl, where these radicals may be



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partially or fully halogenated or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyloxy, heterocyclyl, heterocyclyloxy, benzyl, benzyloxy, aryl, aryloxy, arylthio, hetaryl, hetaryloxy and hetarylthio, where the cyclic groups for their part may be partially or fully halogenated or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkyloxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy, arylthio, hetaryl, hetaryloxy, hetarylthio or C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;

are aryl, arylcarbonyl, arylsulfonyl, hetaryl, hetarylcarbonyl or hetarylsulfonyl, where these radicals may be partially or fully halogenated or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkyloxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,

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## 3

C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy, hetaryl, hetaryloxy or C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;

R<sup>5</sup> is hydrogen,

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is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkynyl, where the hydrocarbon radicals of these groups may be partially or fully halogenated or may carry one to three of the following radicals: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyloxy, heterocyclyl, heterocyclyloxy, aryl, aryloxy, aryl-C<sub>1</sub>-C<sub>4</sub>-alkoxy, arylthio, aryl-C<sub>1</sub>-C<sub>4</sub>-alkylthio, hetaryl, hetaryloxy, hetaryl-C<sub>1</sub>-C<sub>4</sub>-alkoxy, hetarylthio, hetaryl-C<sub>1</sub>-C<sub>4</sub>-alkylthio, where the cyclic radicals for their part may be partially or fully halogenated and/or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl [sic], C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy, arylthio, hetaryl, hetaryloxy, hetarylthio and C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;

is C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkenyl, heterocyclyl, aryl, hetaryl, where the cyclic radicals may be partially or fully halogenated or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio,

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5 C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino,  
C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,  
C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy,  
hetaryl and hetaryloxy;

where

10 A is oxygen, sulfur or nitrogen and where the nitrogen  
carries hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl;

n is 0 or 1;

15 R<sup>7</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl and

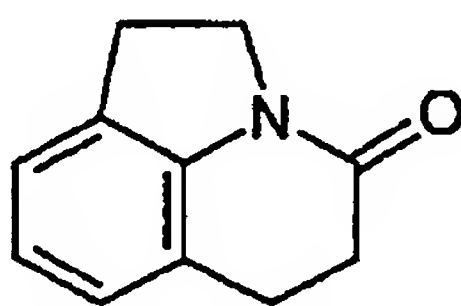
R<sup>8</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl,

20 and their salts,

and

25 b) at least one fungicide selected from fungicides of the  
formulae II to VII

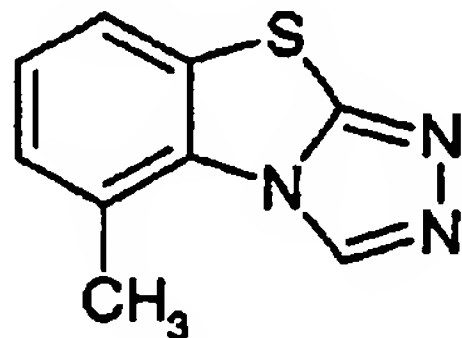
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(II)

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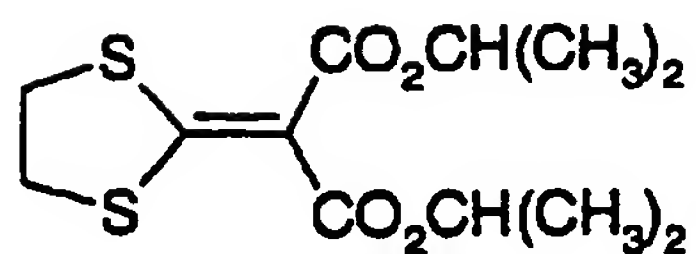
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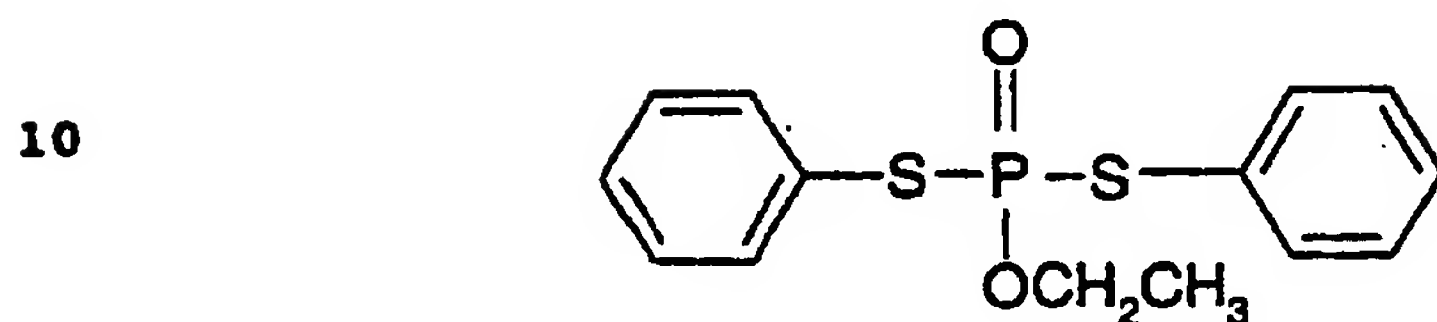
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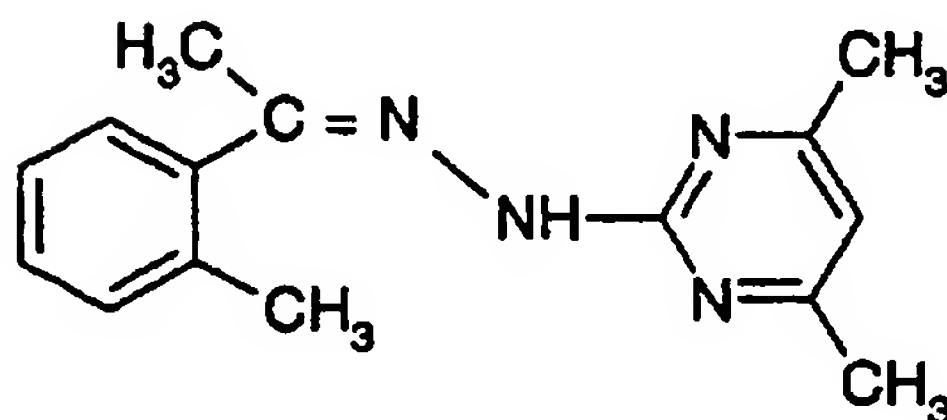
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(V)

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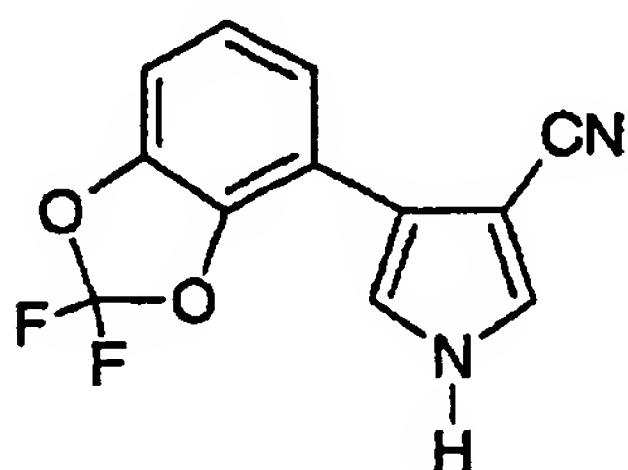
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(VI)

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(VII)

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35 It is an object of the present invention to provide fungicidal mixtures having good fungicidal activity, in particular against fungal diseases in rice, exceeding the activity of the mixture components on their own.

40 We have found that this object is achieved by the mixtures as claimed in claim 1.

The compounds of the formula I are known per se and are described in the literature (WO 97/15552).

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The fungicides of the formulae II to VII are also known and described in the literature. Additionally, they are commercially

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## 6

available under the trade names mentioned below in brackets:

- II: GB 1,394,373; common name: pyroquilon (trade name: Coratop®,  
from Novartis);
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- III: GB 1,419,121, common name: tricyclazole (trade name Beam®,  
from Dow Elanco);
- 10 IV: Proc. Insect. Fungic. Conf. 8th, 2 (1975), 715, common name:  
isoprothiolane (trade name: Fuji-one®, from Nihon Noyaku);
- V: DE 14 93 736, common name: edifenphos (trade name: Hinosan®,  
from Bayer);
- 15
- VI: GB-A 1,312,536, US-A 3,755,350; common name: ferimzone (from  
Takeda);
- 20 VII: Pesticide Manual 10th Ed., 1994, 482; common name:  
fludioxinil (trade name: Celest®, from Novartis).

Owing to their C=C and C=N double bonds, the preparation of the  
compounds I may yield E/Z isomer mixtures which can be separated  
25 into the individual compounds in a customary manner, for example  
by crystallization or chromatography.

However, if the synthesis yields isomer mixtures, a separation is  
generally not necessarily required since in some cases the  
30 individual isomers can be converted into one another during the  
preparation for use or upon use (for example under the action of  
light, acids or bases). Corresponding conversions may also occur  
after the use, for example in the treatment of plants in the  
treated plant or in the harmful fungus or animal pest to be  
35 controlled.

With regard to the C=X double bond, preference is given to the E  
isomers of the compounds I (configuration based on the -OCH<sub>3</sub> or  
the -CH<sub>3</sub> group in relation to the -CO<sub>2</sub>R<sup>1</sup> group) with respect to  
40 their activity.

With regard to the -C(R<sup>3</sup>)=NOCH<sub>2</sub>- double bond, preference is given  
to the cis isomers of the compounds I (configuration based on the  
radical R<sup>3</sup> in relation to the -OCH<sub>2</sub>- group) with respect to their  
45 activity.

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In the definitions of the compounds I given at the outset, collective terms were used which generally represent the following groups:

5 Halogen: fluorine, chlorine, bromine and iodine;

Alkyl: straight-chain or branched alkyl groups having 1 to 4, 6 or 10 carbon atoms, for example C<sub>1</sub>-C<sub>6</sub>-alkyl such as methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, 10 1,1-dimethylethyl, pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-di-methylpropyl, 1-ethylpropyl, hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 15 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl and 1-ethyl-2-methylpropyl;

20 Haloalkyl: straight-chain or branched alkyl groups having 1 to 6 carbon atoms, it being possible for some or all of the hydrogen atoms in these groups to be replaced by halogen atoms as mentioned above, for example C<sub>1</sub>-C<sub>2</sub>-haloalkyl, such as 25 chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 30 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl and pentafluoroethyl;

Cycloalkyl: monocyclic alkyl groups having 3 to 6 carbon ring members, for example cyclopropyl, cyclobutyl, cyclopentyl and 35 cyclohexyl;

Alkenyl: straight-chain or branched alkenyl groups having 2 to 6 or 10 carbon atoms and a double bond in any position, for example C<sub>2</sub>-C<sub>6</sub>-alkenyl, such as ethenyl, 1-propenyl, 2-propenyl, 40 1-methylethenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl, 1-pentenyl, 2-pentenyl, 3-pentenyl, 4-pentenyl, 1-methyl-1-butenyl, 2-methyl-1-butenyl, 3-methyl-1-butenyl, 1-methyl-2-butenyl, 2-methyl-2-butenyl, 45 3-methyl-2-butenyl, 1-methyl-3-butenyl, 2-methyl-3-butenyl, 3-methyl-3-butenyl, 1,1-dimethyl-2-propenyl, 1,2-dimethyl-1-propenyl, 1,2-dimethyl-2-propenyl,

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- 1-ethyl-1-propenyl, 1-ethyl-2-propenyl, 1-hexenyl, 2-hexenyl, 3-hexenyl, 4-hexenyl, 5-hexenyl, 1-methyl-1-pentenyl, 2-methyl-1-pentenyl, 3-methyl-1-pentenyl, 4-methyl-1-pentenyl, 1-methyl-2-pentenyl, 2-methyl-2-pentenyl, 3-methyl-2-pentenyl, 4-methyl-2-pentenyl, 1-methyl-3-pentenyl, 2-methyl-3-pentenyl, 3-methyl-3-pentenyl, 4-methyl-3-pentenyl, 1-methyl-4-pentenyl, 2-methyl-4-pentenyl, 3-methyl-4-pentenyl, 4-methyl-4-pentenyl, 1,1-dimethyl-2-butenyl, 1,1-dimethyl-3-butenyl, 1,2-dimethyl-1-butenyl, 1,2-dimethyl-2-butenyl, 1,2-dimethyl-3-butenyl, 1,3-dimethyl-1-butenyl, 1,3-dimethyl-2-butenyl, 1,3-dimethyl-3-butenyl, 2,2-dimethyl-3-butenyl, 2,3-dimethyl-1-butenyl, 2,3-dimethyl-2-butenyl, 2,3-dimethyl-3-butenyl, 3,3-dimethyl-1-butenyl, 3,3-dimethyl-2-butenyl, 1-ethyl-1-butenyl, 1-ethyl-2-butenyl, 1-ethyl-3-butenyl, 2-ethyl-1-butenyl, 2-ethyl-2-butenyl, 2-ethyl-3-butenyl, 1,1,2-trimethyl-2-propenyl, 1-ethyl-1-methyl-2-propenyl, 1-ethyl-2-methyl-1-propenyl and 1-ethyl-2-methyl-2-propenyl;
- 20 Alkynyl: straight-chain or branched alkynyl groups having 2 to 10 carbon atoms and a triple bond in any position, for example C<sub>2</sub>-C<sub>6</sub>-alkynyl, such as ethynyl, 2-propynyl, 2-butyne, 3-butyne, 1-methyl-2-propynyl, 2-pentyne, 3-pentyne, 4-pentyne, 1-methyl-2-butyne, 1-methyl-3-butyne, 2-methyl-3-butyne,
- 25 1,1-dimethyl-2-propynyl, 1-ethyl-2-propynyl, 2-hexynyl, 3-hexynyl, 4-hexynyl, 5-hexynyl, 1-methyl-2-pentyne, 1-methyl-3-pentyne, 1-methyl-4-pentyne, 2-methyl-3-pentyne, 2-methyl-4-pentyne, 3-methyl-4-pentyne, 4-methyl-2-pentyne, 1,1-dimethyl-2-butyne, 1,1-dimethyl-3-butyne,
- 30 1,2-dimethyl-3-butyne, 2,2-dimethyl-3-butyne, 1-ethyl-2-butyne, 1-ethyl-3-butyne, 2-ethyl-3-butyne and 1-ethyl-1-methyl-2-propynyl;
- 35 Heterocyclyl or heterocycloxy, heterocyclylthio and heterocyclylamino: three- to six-membered saturated or partially unsaturated mono- or polycyclic heterocycles which contain one to three heteroatoms selected from a group consisting of oxygen, nitrogen and sulfur and which are attached to the skeleton directly or (heterocycloxy) via an oxygen atom or
- 40 (heterocyclylthio) via a sulfur atom or (heterocyclylamino) via a nitrogen atom, such as, for example, 2-tetrahydrofuranyl, oxiranyl, 3-tetrahydrofuranyl, 2-tetrahydrothienyl, 3-tetrahydrothienyl, 2-pyrrolidinyl, 3-pyrrolidinyl, 3-isoxazolidinyl, 4-isoxazolidinyl, 5-isoxazolidinyl,
- 45 3-isothiazolidinyl, 4-isothiazolidinyl, 5-isothiazolidinyl, 3-pyrazolidinyl, 4-pyrazolidinyl, 5-pyrazolidinyl, 2-oxazolidinyl, 4-oxazolidinyl, 5-oxazolidinyl, 2-thiazolidinyl,

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- 4-thiazolidinyl, 5-thiazolidinyl, 2-imidazolidinyl,  
 4-imidazolidinyl, 1,2,4-oxadiazolidin-3-yl,  
 1,2,4-oxadiazolidin-5-yl, 1,2,4-thiadiazolidin-3-yl,  
 1,2,4-thiadiazolidin-5-yl, 1,2,4-triazolidin-3-yl,  
 5 1,3,4-oxadiazolidin-2-yl, 1,3,4-thiadiazolidin-2-yl,  
 1,3,4-triazolidin-2-yl, 2,3-dihydrofur-2-yl, 2,3-dihydrofur-3-yl,  
 2,3-dihydrofur-4-yl, 2,3-dihydrofur-5-yl, 2,5-dihydrofur-2-yl,  
 2,5-dihydrofur-3-yl, 2,3-dihydrothien-2-yl,  
 2,3-dihydrothien-3-yl, 2,3-dihydrothien-4-yl,  
 10 2,3-dihydrothien-5-yl, 2,5-dihydrothien-2-yl,  
 2,5-dihydrothien-3-yl, 2,3-dihydropyrrol-2-yl,  
 2,3-dihydropyrrol-3-yl, 2,3-dihydropyrrol-4-yl, 2,3-dihydro-  
 pyrrol-5-yl, 2,5-dihydropyrrol-2-yl, 2,5-dihydropyrrol-3-yl,  
 2,3-dihydroisoxazol-3-yl, 2,3-dihydroisoxazol-4-yl,  
 15 2,3-dihydroisoxazol-5-yl, 4,5-dihydroisoxazol-3-yl,  
 4,5-dihydroisoxazol-4-yl, 4,5-dihydroisoxazol-5-yl,  
 2,5-dihydroisothiazol-3-yl, 2,5-dihydroisothiazol-4-yl,  
 2,5-dihydroisothiazol-5-yl, 2,3-dihydroisopyrazol-3-yl,  
 2,3-dihydroisopyrazol-4-yl, 2,3-dihydroisopyrazol-5-yl,  
 20 4,5-dihydroisopyrazol-3-yl, 4,5-dihydroisopyrazol-4-yl,  
 4,5-dihydroisopyrazol-5-yl, 2,5-dihydroisopyrazol-3-yl,  
 2,5-dihydroisopyrazol-4-yl, 2,5-dihydroisopyrazol-5-yl,  
 2,3-dihydrooxazol-3-yl, 2,3-dihydrooxazol-4-yl,  
 2,3-dihydrooxazol-5-yl, 4,5-dihydrooxazol-3-yl,  
 25 4,5-dihydrooxazol-4-yl, 4,5-dihydrooxazol-5-yl,  
 2,5-dihydrooxazol-3-yl, 2,5-dihydrooxazol-4-yl,  
 2,5-dihydrooxazol-5-yl, 2,3-dihydrothiazol-2-yl,  
 2,3-dihydrothiazol-4-yl, 2,3-dihydrothiazol-5-yl,  
 4,5-dihydrothiazol-2-yl, 4,5-dihydrothiazol-4-yl,  
 30 4,5-dihydrothiazol-5-yl, 2,5-dihydrothiazol-2-yl,  
 2,5-dihydrothiazol-4-yl, 2,5-dihydrothiazol-5-yl,  
 2,3-dihydroimidazol-2-yl, 2,3-dihydroimidazol-4-yl,  
 2,3-dihydroimidazol-5-yl, 4,5-dihydroimidazol-2-yl,  
 4,5-dihydroimidazol-4-yl, 4,5-dihydroimidazol-5-yl,  
 35 2,5-dihydroimidazol-2-yl, 2,5-dihydroimidazol-4-yl,  
 2,5-dihydroimidazol-5-yl, 2-morpholinyl, 3-morpholinyl,  
 2-piperidinyl, 3-piperidinyl, 4-piperidinyl,  
 3-tetrahydropyridazinyl, 4-tetrahydropyridazinyl,  
 2-tetrahydropyrimidinyl, 4-tetrahydropyrimidinyl,  
 40 5-tetrahydropyrimidinyl, 2-tetrahydropyrazinyl,  
 1,3,5-tetrahydrotriazin-2-yl, 1,2,4-tetrahydrotriazin-3-yl,  
 1,3-dihydrooxazin-2-yl, 1,3-dithian-2-yl, 2-tetrahydropyranyl,  
 1,3-dioxolan-2-yl, 3,4,5,6-tetrahydropyridin-2-yl,  
 4H-1,3-thiazin-2-yl, 4H-3,1-benzothiazin-2-yl,  
 45 1,1-dioxo-2,3,4,5-tetrahydrothien-2-yl, 2H-1,4-benzothiazin-3-yl,  
 2H-1,4-benzoxazin-3-yl, 1,3-dihydrooxazin-2-yl, 1,3-dithian-2-yl;



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## 10

Aryl or aryloxy, arylthio, arylcarbonyl and arylsulfonyl:

aromatic mono- or polycyclic hydrogen radicals which are attached to the skeleton directly or (aryloxy) via an oxygen atom (-O-) or (arylthio) a sulfur atom (-S-), (arylcarbonyl) via a carbonyl group (-CO-) or (arylsulfonyl) via a sulfonyl group (-SO<sub>2</sub>-), for example phenyl, naphthyl and phenanthrenyl or phenyloxy, naphthyloxy and phenanthrenyloxy and the corresponding carbonyl and sulfonyl radicals;

10 Hetaryl or hetaryloxy, hetarylthio, hetarylcarbonyl and

hetarylsulfonyl: aromatic mono- or polycyclic radicals which, beside carbon ring members, can additionally contain one to four nitrogen atoms or one to three nitrogen atoms and one oxygen or one sulfur atom or one oxygen or one sulfur atom and which are attached to the skeleton directly or (hetaryloxy) via an oxygen atom (-O-) or (hetarylthio) a sulfur atom (-S-); (hetarylcarbonyl) via a carbonyl group (-CO-) or (hetarylsulfonyl) via a sulfonyl group (-SO<sub>2</sub>-), for example

- 20 - 5-membered heteroaryl, containing one to three nitrogen atoms: 5-membered heteroaryl groups which, beside carbon atoms, can contain one to three nitrogen atoms as ring members, for example 2-pyrrolyl, 3-pyrrolyl, 3-pyrazolyl, 4-pyrazolyl, 5-pyrazolyl, 2-imidazolyl, 4-imidazolyl, 1,2,4-triazol-3-yl and 1,3,4-triazol-2-yl;
- 25
- 30 - 5-membered heteroaryl, containing one to four nitrogen atoms or one to three nitrogen atoms and one sulfur or oxygen atom or one oxygen or one sulfur atom: 5-membered heteroaryl groups which, beside carbon atoms, can contain one to four nitrogen atoms or one to three nitrogen atoms and one sulfur or oxygen atom or one oxygen or sulfur atom as ring members, for example 2-furyl, 3-furyl, 2-thienyl, 3-thienyl, 2-pyrrolyl, 3-pyrrolyl, 3-isoxazolyl, 4-isoxazolyl, 5-isoxazolyl, 3-isothiazolyl, 4-isothiazolyl, 5-isothiazolyl, 3-pyrazolyl, 4-pyrazolyl, 5-pyrazolyl, 2-oxazolyl, 4-oxazolyl, 5-oxazolyl, 2-thiazolyl, 4-thiazolyl, 5-thiazolyl, 2-imidazolyl, 4-imidazolyl, 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl, 1,2,4-thiadiazol-3-yl, 1,2,4-thiadiazol-5-yl, 1,2,4-triazol-3-yl, 1,3,4-oxadiazol-2-yl, 1,3,4-thiadiazol-2-yl, 1,3,4-triazol-2-yl;
- 35
- 40
- 45 - benzo-fused 5-membered heteroaryl, containing one to three nitrogen atoms or one nitrogen atom and/or one oxygen or sulfur atom: 5-membered heteroaryl groups which, beside

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carbon atoms, can contain one to four nitrogen atoms or one to three nitrogen atoms and one sulfur or oxygen atom or one oxygen or one sulfur atom as ring members, and in which two adjacent carbon ring members or one nitrogen and one adjacent carbon ring member may be bridged by a buta-1,3-dien-1,4-diyl group;

- 5-membered heteroaryl bonded via nitrogen and containing one to four nitrogen atoms, or benzo-fused 5-membered heteroaryl bonded via nitrogen and containing one to three nitrogen atoms: 5-membered heteroaryl groups which, beside carbon atoms, can contain one to four nitrogen atoms and one to three nitrogen atoms, respectively, as ring members, and in which two adjacent carbon ring members or one nitrogen and one adjacent carbon ring member can be bridged by a buta-1,3-dien-1,4-diyl group, these rings being attached to the skeleton via one of the nitrogen ring members;

- 6-membered heteroaryl containing one to three and one to four nitrogen atoms, respectively: 6-membered heteroaryl groups which, beside carbon atoms, can contain one to three nitrogen atoms and one to four nitrogen atoms, respectively, as ring members, for example 2-pyridinyl, 3-pyridinyl, 4-pyridinyl, 3-pyridazinyl, 4-pyridazinyl, 2-pyrimidinyl, 4-pyrimidinyl, 5-pyrimidinyl, 2-pyrazinyl, 1,3,5-triazin-2-yl, 1,2,4-triazin-3-yl and 1,2,4,5-tetrazin-3-yl;

- benzo-fused 6-membered heteroaryl containing one to four nitrogen atoms: 6-membered heteroaryl groups in which two adjacent carbon ring members can be bridged by a buta-1,3-dien-1,4-diyl group, for example quinoline, isoquinoline, quinazoline and quinoxaline,

and the corresponding oxy, thio, carbonyl or sulfonyl groups.

Hetarylamino: aromatic mono- or polycyclic radicals which, beside carbon ring members, can additionally contain one to four nitrogen atoms or one to three nitrogen atoms and one oxygen or one sulfur atom and which are attached to the skeleton via a nitrogen atom.

The specification "partially or fully halogenated" is meant to express that some or all of the hydrogen atoms in the groups thus characterized may be replaced by identical or different halogen atoms as mentioned above.

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## 12

With respect to their biological activity, preference is given to compounds of the formula I in which m is 0.

5 Likewise, preference is given to compounds of formula I in which R<sup>1</sup> is methyl.

Besides, preference is given to compounds I in which R<sup>3</sup> is hydrogen, cyano, cyclopropyl, methyl, ethyl, 1-methylethyl or CF<sub>3</sub>.

10 Moreover, preference is given to compounds I in which R<sup>3</sup> is methyl.

15 Besides, preference is given to compounds I in which R<sup>3</sup> is cyano.

Furthermore, preference is given to compounds I in which R<sup>3</sup> is cyclopropyl.

20 Additionally, preference is given to compounds I in which R<sup>3</sup> is CF<sub>3</sub>.

25 Additionally, preference is given to compounds I in which R<sup>5</sup> is hydrogen, cyclopropyl, methyl, ethyl, isopropyl, unsubstituted or substituted aryl or hetaryl.

Moreover, preference is given to compounds I in which R<sup>5</sup> is methyl.

30 Additionally, preference is given to compounds I in which R<sup>5</sup> is ethyl.

35 Moreover, preference is given to compounds I in which R<sup>5</sup> is isopropyl.

Moreover, preference is given to compounds I in which R<sup>5</sup> is cyclopropyl.

40 Moreover, preference is given to compounds I in which R<sup>5</sup> is CF<sub>3</sub>.

Additionally, preference is given to compounds I in which R<sup>5</sup> is unsubstituted or substituted aryl or hetaryl.

45 Additionally, preference is given to compounds I in which R<sup>5</sup> is unsubstituted or substituted pyridyl, pyrimidyl, pyrazinyl,



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pyridazinyl or triazinyl.

Additionally, preference is given to compounds I in which R<sup>5</sup> is unsubstituted or substituted furyl, thienyl or pyrrolyl.

5

Additionally, preference is given to compounds I in which R<sup>5</sup> is unsubstituted or substituted oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, pyrazolyl or imidazolyl.

10

Additionally, preference is given to compounds I in which R<sup>5</sup> is unsubstituted or substituted oxdiazolyl [sic], thiadiazolyl or triazolyl.

- 15 Moreover, preference is given to compounds I in which R<sup>5</sup> is phenyl which is unsubstituted or carries one or two of the following groups: nitro, cyano, hydroxyl, amino, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylamino, 20 di-C<sub>1</sub>-C<sub>4</sub>-alkylamino, C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl or di-C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl.

- Moreover, preference is given to compounds I in which R<sup>4</sup> is hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkynyl, allyl, 25 arylalkyl, hetarylalkyl, aryloxyalkyl, hetaryloxyalkyl, aryl or hetaryl.

- Additionally, preference is given to compounds I in which R<sup>4</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl. 30

Further preferred compounds I are disclosed in WO 97/15,552.

- The compounds II which are contained in the mixtures according to 35 the invention are distinguished by excellent activity against a broad range of phytopathogenic fungi, in particular against fungi from the classes of the Ascomycetes, Deuteromycetes, Phycomycetes and Basidiomycetes.

- 40 They are especially important for controlling a large number of fungi in a variety of crop plants, such as cotton, vegetable species (for example cucumbers, beans, tomatoes, potatoes and cucurbits), barley, grass, oats, bananas, coffee, maize, fruit species, rice, rye, soya, grapevine, wheat, ornamentals, sugar 45 cane, and a variety of seeds.

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They are particularly suitable for controlling the following phytopathogenic fungi: *Erysiphe graminis* (powdery mildew) in cereals, *Erysiphe cichoracearum* and *Sphaerotheca fuliginea* in cucurbits, *Podosphaera leucotricha* in apples, *Uncinula necator* in  
 5 grapevines, *Puccinia* species in cereals, *Rhizoctonia* species in cotton, rice and lawns, *Ustilago* species in cereals and sugar cane, *Venturia inaequalis* (scab) in apples, *Helminthosporium* species in cereals and rice, *Septoria nodorum* in wheat, *Botrytis cinera* [sic] (gray mold) in strawberries, vegetables, ornamentals  
 10 and grapevines, *Cercospora arachidicola* in groundnuts, *Pseudocercospora herpotrichoides* in wheat and barley, *Pyricularia oryzae* in rice and lawns, *Phytophthora infestans* in potatoes and tomatoes, *Plasmopara viticola* in grapevines, *Pseudoperonospora* species in hops and cucumbers, *Alternaria*  
 15 species in vegetables and fruit, *Mycosphaerella* species in bananas and *Fusarium* and *Verticillium* species.

The compounds II to VII are commercially available as fungicides.

20 When preparing the mixtures, it is preferred to employ the pure active ingredients I and II to VII, with which further active ingredients against harmful fungi or other pests, such as insects, arachnids or nematodes, or else herbicidal or  
 25 growth-regulating active ingredients or fertilizers can be admixed.

The mixtures of the compounds I and at least one compound II to VII can be applied simultaneously, that is joined or separately,  
 30 and have outstanding action against a wide range of phytopathogenic fungi, in particular from the classes of the Ascomycetes, Basidiomycetes, Phycomycetes and Deuteromycetes. Some of them act systematically and are therefore also suitable for use as folio and soil-acting fungicides.

35 They are especially important for controlling a large number of fungi in a variety of crop plants, such as cotton, vegetable species (for example cucumbers, beans, tomatoes, potatoes and cucurbits), barley, grass, oats, bananas, coffee, maize, fruit  
 40 species, rice, rye, soya, grapevine, wheat, ornamentals, sugar cane, and a variety of seeds.

They are particularly suitable for controlling the following phytopathogenic fungi: *Erysiphe graminis* (powdery mildew) in  
 45 cereals, *Erysiphe cichoracearum* and *Sphaerotheca fuliginea* in cucurbits, *Podosphaera leucotricha* in apples, *Uncinula necator* in grapevines, *Puccinia* species in cereals, *Rhizoctonia* species in

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## 15

cotton, rice and lawns, *Ustilago* species in cereals and sugar cane, *Venturia inaequalis* (scab) in apples, *Helminthosporium* species in cereals and rice, *Septoria nodorum* in wheat, *Botrytis cinera* [sic] (gray mold) in strawberries, vegetables, ornamentals  
5 and grapevines, *Cercospora arachidicola* in groundnuts, *Pseudocercospora herpotrichoides* in wheat and barley, *Pyricularia oryzae* in rice and lawns, *Phytophthora infestans* in potatoes and tomatoes, *Plasmopara viticola* in grapevines, *Pseudoperonospora* species in hops and cucumbers, *Alternaria*  
10 species in vegetables and fruit, *Mycosphaerella* species in bananas and *Fusarium* and *Verticillium* species.

The mixtures according to the invention are particularly preferably utilizable for controlling *Pyricularia oryzae*.  
15

The compounds I and at least one of the compounds II to VII can be applied simultaneously, either together or separately, or in succession, the sequence, in the case of separate application, generally not having any effect on the control results.  
20

Depending on the nature of the desired effect, the application rates of the mixtures according to the invention are, in particular in agricultural crops, from 0.01 to 8 kg/ha, preferably from 0.1 to 5 kg/ha, in particular from 0.5 to 3.0 kg/ha.  
25

In the case of the compounds I, the application rates are from 0.01 to 2.5 kg/ha, preferably from 0.05 to 2.5 kg/ha, in particular from 0.1 to 1.0 kg/ha.  
30

Correspondingly, in the case of the compounds II to VII, the application rates are from 0.001 to 5 kg/ha, preferably from 0.005 to 2 kg/ha, in particular from 0.01 to 1.0 kg/ha.  
35

For seed treatment, the application rates of the mixture are generally from 0.001 to 250 g/kg of seed, preferably 0.01 to 100 g/kg, in particular 0.01 to 50 g/kg.

40 If phytopathogenic harmful fungi are to be controlled, the separate or joint application of the compounds I and at least one of the compounds II to VII is effected by spraying or dusting the seeds, the plants or the soils before or after sowing the plants, or before or after plant emergence.  
45

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The fungicidal synergistic mixtures according to the invention can be formulated for example in the form of ready-to-spray solutions, powders and suspensions or in the form of highly concentrated aqueous, oily or other suspensions, dispersions, 5 emulsions, oil dispersions, pastes, dusts, materials for broadcasting or granules, and applied by spraying, atomizing, dusting, broadcasting or watering. The use form depends on the intended purpose; in any case, it should ensure as fine and uniform as possible a distribution of the mixture according to 10 the invention.

The formulations are prepared in a known manner, for example by expanding the active ingredient with solvents and/or carriers, if desired by use of emulsifiers and dispersants. If the diluent 15 used is water, it is also possible to use other organic solvents as auxiliary solvents. Suitable auxiliaries are essentially: solvents, such as aromatics (for example xylene), chlorinated aromatics (for example chlorobenzenes), paraffins (for example mineral oil fractions), alcohols (for example methanol, butanol), 20 ketones (for example cyclohexanone), amines (for example ethanolamine, dimethylformamide) and water; carriers, such as natural ground minerals (for example kaolins, clays, talc, chalk) and ground synthetic minerals (for example finely divided silica gel, silicates); emulsifiers, such as nonionic and anionic 25 emulsifiers (for example polyoxyethylene fatty alcohol ethers, alkylsulfonates and arylsulfonates), and dispersants, such as ligninsulfite waste liquors and methylcellulose.

Suitable surfactants are the alkali metal salts, alkaline earth 30 metal salts and ammonium salts of aromatic sulfonic acids, e.g. ligno-, phenol-, naphthalene- and dibutyl-naphthalenesulfonic acid, and of fatty acids, alkyl- and alkylarylsulfonates, alkyl, lauryl ethers and fatty alcohol sulfates, and salts of sulfated 35 hexa-, hepta- and octadecanols, or of fatty alcohol glycol ethers, condensates of sulfonated naphthalene and its derivatives with formaldehyde, condensates of naphthalene or of the naphthalenesulfonic acids with phenol and formaldehyde, polyoxyethylene octylphenol ether, ethoxylated isooctyl-, octyl- 40 or nonylphenol, alkylphenol polyglycol ethers, tributylphenyl polyglycol ethers, alkylaryl polyether alcohols, isotridecyl alcohol, fatty alcohol ethylene oxide condensates, ethoxylated castor oil, polyoxyethylene alkyl ethers or polyoxypropylene [sic], lauryl alcohol polyglycol ether acetate, sorbitol esters, 45 lignosulfite waste liquors or methylcellulose.

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Powders, materials for broadcasting and dusts can be prepared by mixing or jointly grinding the compounds I and at least one of the compounds II to VII or the mixture of the compounds I and at least one of the compounds II to VII with a solid carrier.

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Granules (eg. coated granules, impregnated granules or homogeneous granules) are usually prepared by binding the active ingredient, or active ingredients, to a solid carrier.

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Fillers or solid carriers are, for example, mineral earths, such as silica gel, silicic acids, silica gels [sic], silicates, talc, kaolin, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium

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oxide, ground synthetic materials, and fertilizers, such as ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders or other solid carriers.

20

The formulations generally comprise 0.1 to 95% by weight, preferably 0.5 to 90% by weight, of one of the compounds I and at least one of the compounds II to VII or of the mixture of the compounds I and at least one of the compounds II to VII. The

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active ingredients are employed in a purity of from 90% to 100%, preferably 95% to 100% (according to NMR or HPLC spectrum [sic]).

The corresponding formulations are applied by treating the harmful fungi, their habitat or the plants, seeds, soils, areas, materials or spaces to be kept free from them with a fungicidally effective amount of the mixture, or of the compounds I and at least one of the compounds II to VII in the case of separate application.

35

Application can be effected before or after infection by the harmful fungi.

Examples of such preparations comprising the active ingredients are:

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I. A solution of 90 parts by weight of the active ingredients and 10 parts by weight of N-methylpyrrolidone; this solution is suitable for use in the form of microdrops;

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II. A mixture of 20 parts by weight of the active ingredients, 80 parts by weight of xylene, 10 parts by weight of the adduct of 8 to 10 mol of ethylene oxide and 1 mol of oleic



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- acid N-monoethanolamide, 5 parts by weight of the calcium salt of dodecylbenzenesulfonate, 5 parts by weight of the adduct of 40 mol of ethylene oxide and 1 mol of castor oil; a dispersion is obtained by finely distributing the solution in water;
- 5
- III. An aqueous dispersion of 20 parts by weight of the active ingredients, 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 40 mol of ethylene oxide and 1 mol of castor oil;
- 10
- IV. An aqueous dispersion of 20 parts by weight of the active ingredients, 25 parts by weight of cyclohexanol, 65 parts by weight of a mineral oil fraction of boiling point 210 to 280°C, and 10 parts by weight of the adduct of 40 mol of ethylene oxide and 1 mol of castor oil;
- 15
- V. A mixture, ground in a hammer mill, of 80 parts by weight of the active ingredients, 3 parts by weight of the sodium salt of diisobutyl naphthalene-1-sulfonic acid, 10 parts by weight of the sodium salt of a lignosulfonic acid from a sulfite waste liquor and 7 parts by weight of pulverulent silica gel; a spray mixture is obtained by finely distributing the mixture in water;
- 20
- VI. An intimate mixture of 3 parts by weight of the active ingredients and 97 parts by weight of finely divided kaolin; this dust comprises 3% by weight of active ingredient;
- 25
- VII. An intimate mixture of 30 parts by weight of the active ingredients, 92 parts by weight of pulverulent silica gel and 8 parts by weight of paraffin oil which had been sprayed onto the surface of this silica gel; this formulation imparts good adhesion to the active ingredient;
- 30
- VIII. A stable aqueous dispersion of 40 parts by weight of the active ingredients, 10 parts by weight of the sodium salt of a phenolsulfonic acid/urea/formaldehyde condensate, 2 parts by weight of silica gel and 48 parts by weight of water; this dispersion may be diluted further;
- 35
- IX. A stable oily dispersion of 20 parts by weight of the active ingredients, 2 parts by weight of the calcium salt of dodecylbenzenesulfonic acid, 8 parts by weight of fatty alcohol polyglycol ether, 20 parts by weight of the sodium salt of a phenolsulfonic acid/urea/formaldehyde condensate and 88 parts by weight of a paraffinic mineral oil.
- 40
- 45 The synergistic activity of the mixtures according to the invention can be demonstrated by the following experiments:

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The active ingredients, separately or together, are formulated as a 10% emulsion in a mixture of 63% by weight of cyclohexanone and 27% by weight of emulsifier, and correspondingly diluted with water to the desired concentration.

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Evaluation is carried out by determining the infected leaf areas in percent. These percentages are converted into efficacies. The efficacy ( $W$ ) is calculated as follows using Abbot's formula:

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$$W = (1 - \alpha) \cdot 100 / \beta$$

$\alpha$  corresponds to the fungal infection of the treated plants in % and

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$\beta$  corresponds to the fungal infection of the untreated (control) plants in %

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An efficacy of 0 means that the infection level of the treated plants corresponds to that of the untreated control plants; an efficacy of 100 means that the treated plants were not infected.

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The expected efficacies of the mixtures of the active ingredients were determined using Colby's formula [R.S. Colby, Weeds 15, 20-22 (1967)] and compared with the observed efficacies.

$$\text{Colby's formula: } E = x + y - x \cdot y / 100$$

30

$E$  is expected efficacy, expressed in % of the untreated control, when using the mixture of the active ingredients A and B at the concentrations a and b

$x$  is the efficacy, expressed in % of the untreated control, when using active ingredient A at the concentration a

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$y$  is the efficacy, expressed in % of the untreated control, when using active ingredient B at the concentration b

Use Example 1 - Activity against *Pyricularia oryzae* (protective)

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Leaves of potted rice seedlings c.v. "Tai-Nong 67" were sprayed to runoff point with an aqueous preparation of active ingredient which had been prepared from a stock solution comprising 10% of active ingredient, 63% of cyclohexanone and 27% of emulsifier.

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The following day, the plants were inoculated with an aqueous spore suspension of *Pyricularia oryzae*. The test plants were subsequently placed in climatized chambers at 22-24°C and 95-99% relative atmospheric humidity for 6 days. The extent of the deve-

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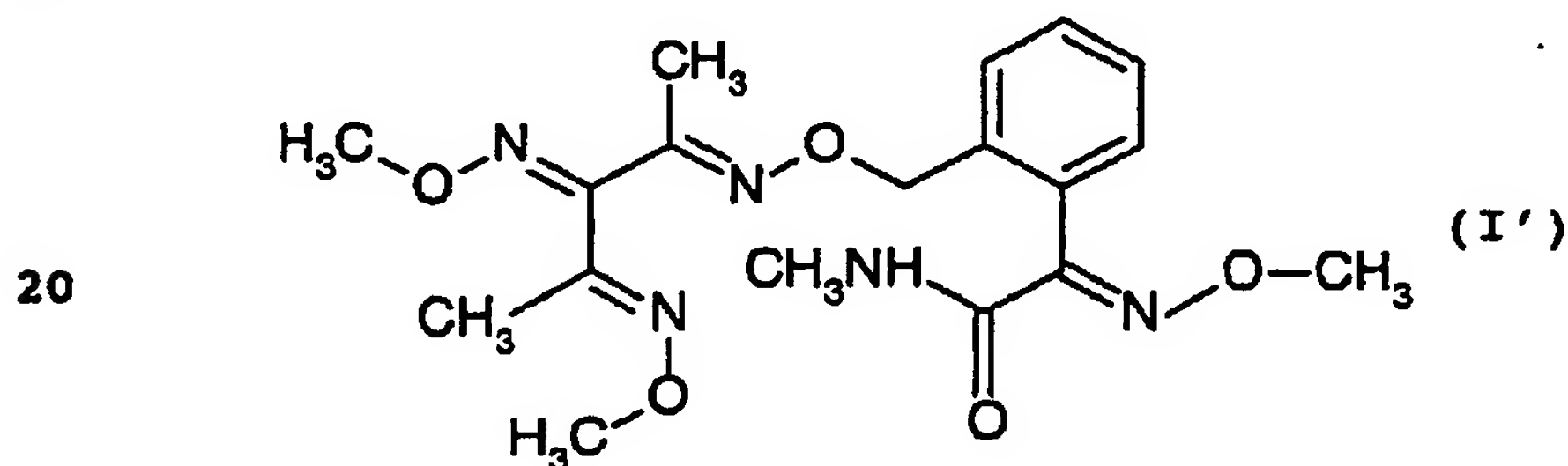
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lopment of the disease on the leaves was then determined visually.

The visually determined values for the percentage of diseased 5 leaf area were converted into efficacies as percent of the untreated control. An efficacy of 0 means the same disease level as in the untreated control, an efficacy of 100 means 0% disease. The expected efficacies for active ingredient combinations were determined using Colby's formula (Colby, S. R.: "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, pp. 20-22, 1967) and compared with the observed efficacies.

As component a), use was made of the following compound I':

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The test results are shown in Tables 1 and 2 below:

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Table 1:

Ex.	Active ingredient	Conc. in ppm	Efficacy in % of the untreated control
5	1C	None	(100% diseased)
	2C	Compound I'	2.0
		0.5	0
	3C	Compound II	0.5
10	4C	Compound IV	2.0
			0

Table 2:

Ex.	Mixture according to the invention (conc. in ppm)	Observed efficacy	Calculated efficacy *
15	5	2 ppm I' + 2 ppm IV	90
	6	0.5 ppm I' + 0.5 ppm II	70
			20
			10

\* calculated using Colby's formula

The test results show that for all mixing ratios, the observed efficacy is higher than the efficacy which had been calculated beforehand using Colby's formula.

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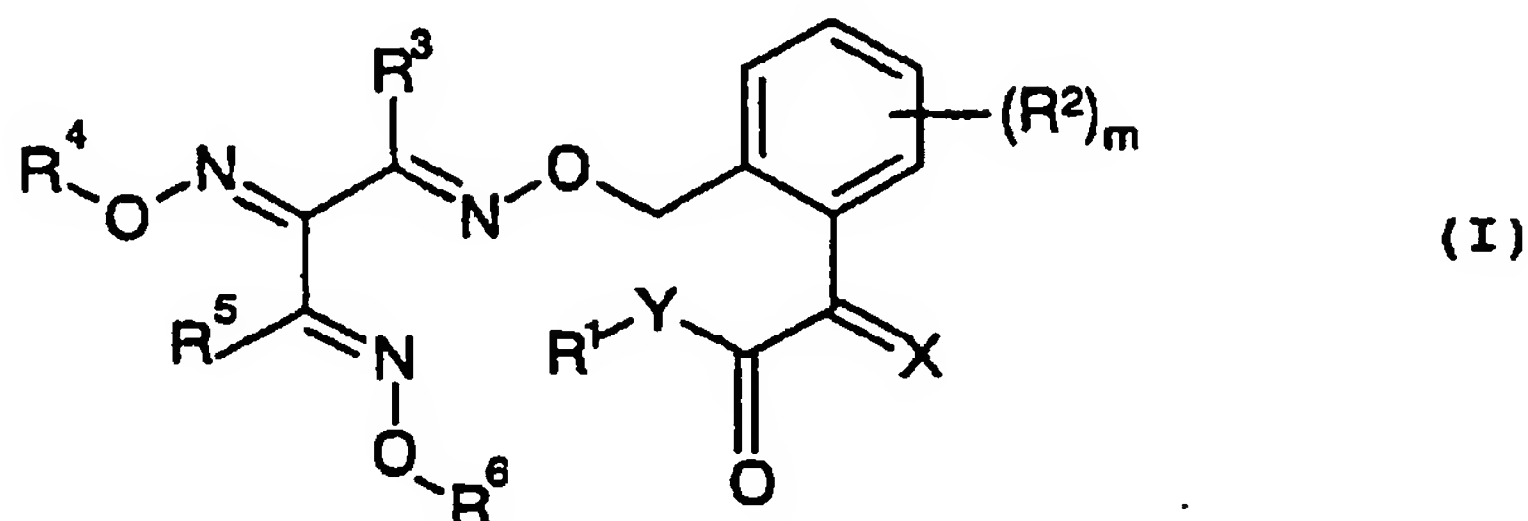
We claim:

1. A fungicidal mixture, comprising as active components

a) phenylacetic acid derivatives of the formula I

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in which the substituents and the index have the following meaning:

X is NOCH<sub>3</sub>, CHOCH<sub>3</sub> or CHCH<sub>3</sub>;

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Y is oxygen or NR;

R<sup>1</sup>, R independently of one another are each hydrogen or C<sub>1</sub>-C<sub>4</sub>-alkyl;

30

R<sup>2</sup> is cyano, nitro, trifluoromethyl, halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxy;

35

m is 0, 1 or 2, where the radicals R<sup>2</sup> may be different if m is 2;

R<sup>3</sup> is hydrogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

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R<sup>4</sup>, R<sup>6</sup> independently of one another are each hydrogen,

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are C<sub>1</sub>-C<sub>10</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>2</sub>-C<sub>10</sub>-alkenyl, C<sub>2</sub>-C<sub>10</sub>-alkynyl, C<sub>1</sub>-C<sub>10</sub>-alkylcarbonyl, C<sub>2</sub>-C<sub>10</sub>-alkenylcarbonyl, C<sub>3</sub>-C<sub>10</sub>-alkynylcarbonyl or C<sub>1</sub>-C<sub>10</sub>-alkylsulfonyl, where these radicals may be partially or fully halogenated or may carry one to three of the following groups: cyano, nitro,

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- hydroxyl, mercapto, amino, carboxyl,  
aminocarbonyl, aminothiocarbonyl, halogen,  
C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy,  
5 C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio,  
C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino,
- are C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino-  
carbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl,  
10 di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,  
C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl,  
C<sub>3</sub>-C<sub>6</sub>-cycloalkyloxy, heterocyclyl, heterocyclyloxy,  
benzyl, benzyloxy, aryl, aryloxy, arylthio,  
hetaryl, hetaryloxy and hetarylthio, where the  
15 cyclic groups for their part may be partially or  
fully halogenated or may carry one to three of the  
following groups: cyano, nitro, hydroxyl,  
mercapto, amino, carboxyl, aminocarbonyl,  
aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl,  
20 C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy,  
C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkyloxycarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
25 di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,  
C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy,  
arylthio, hetaryl, hetaryloxy, hetarylthio or  
30 C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;
- are aryl, arylcarbonyl, arylsulfonyl, hetaryl, he-  
tarylcarbonyl or hetarylsulfonyl, where these ra-  
35 dicals may be partially or fully halogenated or  
may carry one to three of the following groups:  
cyano, nitro, hydroxyl, mercapto, amino, carboxyl,  
aminocarbonyl, aminothiocarbonyl, halogen,  
C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl,  
40 C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy,  
C<sub>1</sub>-C<sub>6</sub>-alkyloxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio,  
C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino,  
C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
45 C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,

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C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy, hetaryl, hetaryloxy or C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;

R<sup>5</sup> is hydrogen,

5

is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkynyl, where the hydrocarbon radicals of these groups may be partially or fully halogenated or may carry one to three of the following radicals: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, halogen, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyloxy, heterocyclyl, heterocyclyloxy, aryl, aryloxy, aryl-C<sub>1</sub>-C<sub>4</sub>-alkoxy, arylthio, aryl-C<sub>1</sub>-C<sub>4</sub>-alkylthio, hetaryl, hetaryloxy, hetaryl-C<sub>1</sub>-C<sub>4</sub>-alkoxy, hetarylthio, hetaryl-C<sub>1</sub>-C<sub>4</sub>-alkylthio, where the cyclic radicals for their part may be partially or fully halogenated and/or may carry one to three of the following groups: cyano, nitro, hydroxyl, mercapto, amino, carboxyl, aminocarbonyl, aminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl [sic], C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl, C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy, arylthio, hetaryl, hetaryloxy, hetarylthio and C(=NOR<sup>7</sup>)-A<sub>n</sub>-R<sup>8</sup>;

45

is C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkenyl, heterocyclyl, aryl, hetaryl, where the cyclic radicals may be partially or fully halogenated or may carry one to three of the following groups:

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5 cyano, nitro, hydroxyl, mercapto, amino, carboxyl,  
aminocarbonyl, aminothiocarbonyl, halogen,  
C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylsulfoxyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy,  
C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylamino,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl,  
10 C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl,  
di-C<sub>1</sub>-C<sub>6</sub>-alkylaminothiocarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenyl,  
C<sub>2</sub>-C<sub>6</sub>-alkenyloxy, benzyl, benzyloxy, aryl, aryloxy,  
hetaryl and hetaryloxy;

15 where

A is oxygen, sulfur or nitrogen and where the nitrogen  
carries hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl;

20 n is 0 or 1;

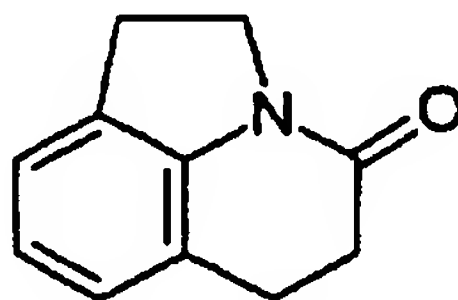
R<sup>7</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl and

25 R<sup>8</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl,

and their salts,

and

30 b) at least one compound of the formulae II to VII

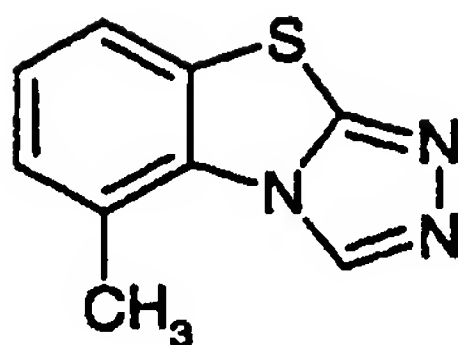


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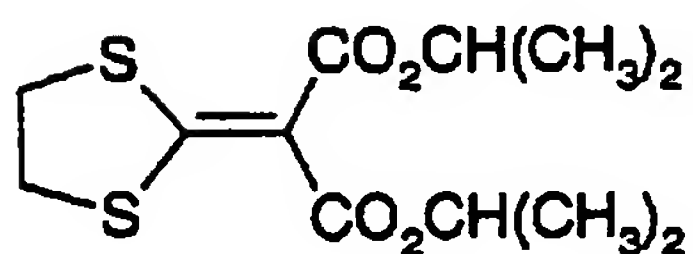
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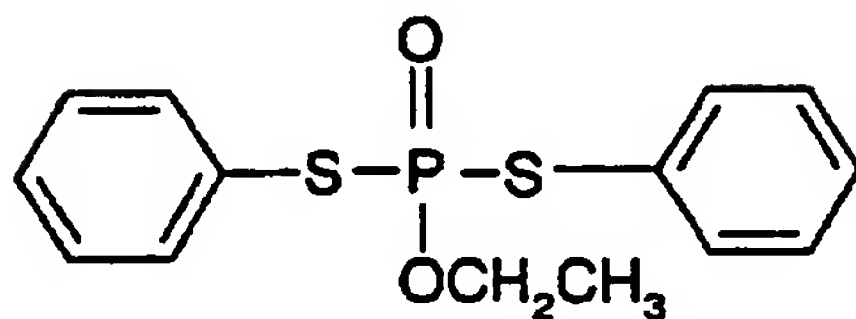
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(IV)

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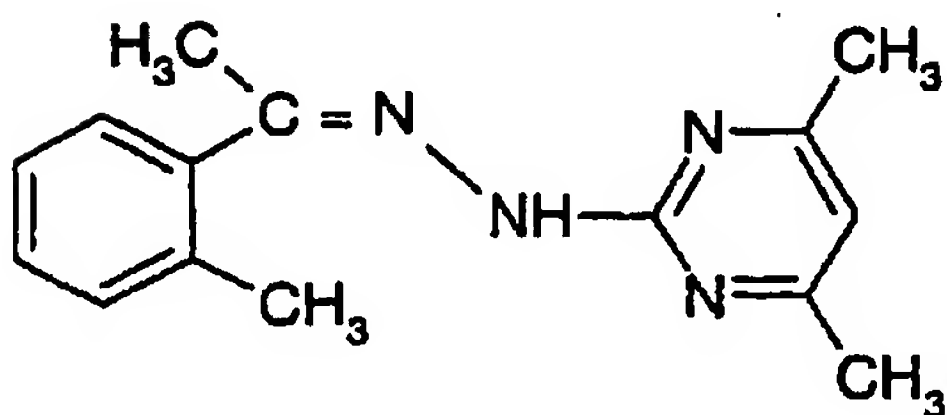
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(V)

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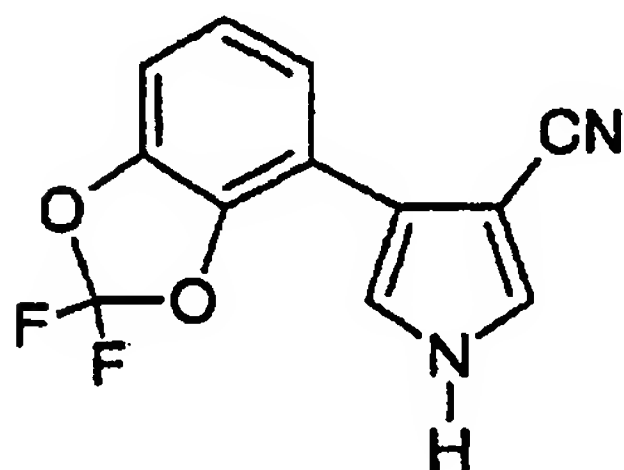
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(VI)

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(VII)

in a synergistically effective amount.

2. A fungicidal mixture as claimed in claim 1, which is  
conditioned in two parts, one part comprising the compound I  
in a solid or liquid carrier and the other part comprising at

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least one of the compounds II to VII in a solid or liquid carrier.

3. A method for controlling harmful fungi, which comprises  
5 treating the fungi, their habitat, or the materials, plants, seeds, soils, areas or spaces to be protected against fungal attack with a fungicidal mixture as claimed in either of claims 1 and 2, where the application of the compound I and at least one of the compounds II to VII may be carried out  
10 simultaneously, either together or separately, or in succession.
4. A method as claimed in claim 3, wherein the harmful fungi, their habitat or the plants, seeds, soils, areas, materials  
15 or spaces to be kept free from them are treated with from 0.005 to 1 kg/ha of a compound I as set forth in claim 1.
5. A method as claimed in claim 3, wherein the harmful fungi, their habitat or the plants, seeds, soils, areas, materials  
20 or spaces to be kept free from them are treated with from 0.01 to 1 kg/ha of at least one of the compounds II to VII as set forth in claim 1.

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